Claims

1. A hard metal of WC for tools for mechanical working of, in particular, stone, concrete, and asphalt, comprising 5 to 25 % by weight of a binder based on Co or Co and Ni and having a coercive field strength up to 17.0 kA/m, characterized in that the hard metal has a magnetic saturation (σ or $4\pi\sigma$, in units of microtesla times cubic meter per kilogram, respectively) as a function of the Co proportion (X) in % by weight of the hard metal in a range of

$\sigma = 0.11\ X$ to $\sigma = 0.137\ X$ or

$4\pi\sigma = 0.44\ \pi\ X$ to $4\pi\sigma = 0.548\ \pi\ X$.

2. The hard metal according to claim 1, characterized in that its coercive field strength is maximally 9.5 kA/m.

3. The hard metal according to claim 1 or 2, characterized in that its coercive field strength is maximally 8.0 kA/m.

4. The hard metal according to one of the claims 1 to 3, characterized in that its coercive field strength is maximally 7.2 kA/m.

5. The hard metal according to one of the claims 1 to 4, characterized in that its coercive field strength is within a range of 1.6 kA/m to 6.4 kA/m.

6. A hard metal of WC for tools for mechanical working of, in particular, stone, concrete, and asphalt, comprising 5 to 25 % by weight of a binder based on Co or Co and Ni and having a coercive field strength above 17.0 kA/m, characterized in that the hard metal has a coercive field strength up to 30.0 kA/m and a magnetic saturation (σ or $4\pi\sigma$, in units of microtesla times cubic meter per kilogram, respectively) as a function of the Co proportion (X) in % by weight of the hard metal in a range of

$\sigma = 0.11\ X$ to $\sigma = 0.130\ X$ or

$4\pi\sigma = 0.44\ \pi\ X$ to $4\pi\sigma = 0.520\ \pi\ X$.

7. The hard metal according to one of the claims 1 to 6, characterized in that its average WC grain size is within a range of 0.2 µm to 20 µm.

8. The hard metal according to one of the claims 1 to 7, characterized in that its average WC grain size is within a range of 2 µm to 20 µm.

9. The hard metal according to one of the claims 1 to 8, characterized in that its average WC grain size is within a range of 4 µm to 20 µm.

10. The hard metal according to one of the claims 1 to 9, characterized in that it contains up to a total of 0.4 % by weight Ta, Nb, and/or Ti in the form of cubic carbides and/or solid solution in the binder.

11. The hard metal according to one of the claims 1 to 10, characterized in that it contains up to, respectively, 1.5 % by weight Cr, Mo, V, Zr, and/or Hf in the form of carbides and/or solid solutions in the binder.

12. The hard metal according to one of the claims 1 to 11, characterized in that the binder contains nanoparticles of ordered phases of W, Co, and/or C.

13. A hard metal of WC comprising 5 to 25 % by weight of a binder based on Co or Co and Ni, characterized in that the binder contains at least 5 % by volume nanoparticles of ordered phases of W, Co, and/or C and the hard metal has a magnetic saturation (σ or $4\pi\sigma$, in units of microtesla times cubic meter per kilogram, respectively) as a function of the Co proportion (X) in % by weight of the hard metal in a range of

$\sigma = 0.11\ X$ to $\sigma = 0.137\ X$ or

$4\pi\sigma = 0.44\ \pi\ X$ to $4\pi\sigma = 0.548\ \pi\ X$.

14. The hard metal according to claim 13, characterized in that it contains up to 40 % by weight carbides, nitrides, and/or carbonitrides of Ta, Nb, Ti, V, Cr, Mo, B, Zr, and/or Hf.

15. The hard metal according to claim 13 or 14, characterized in that the nanoparticles contain Ni, Fe, Ta, Nb, Ti, Cr, Mo, Zr, and/or Hf.

16. The hard metal according to one of the claims 12 to 15, characterized in that the nanoparticles are coherent with the cobalt matrix.

17. The hard metal according to one of the claims 12 to 16, characterized in that the greatest measurable D_{hkl} value of the ordered phases of the nanoparticles is 0.215 nm ± 0.007 nm.

18. The hard metal according to one of the claims 12 to 17, characterized in that at least parts of the nanoparticles have a hexagonal lattice structure.

19. The hard metal according to one of the claims 12 to 18, characterized in that at least parts of the nanoparticles have a cubic lattice structure.

20. The hard metal according to one of the claims 12 to 19, characterized in that the nanoparticles are comprised of one or several of the phases $Co_XW_YC_Z$ with x = 1 to 7, y = 1 to 10, and z = 0 to 4.

21. The hard metal according to claim 20, characterized in that the nanoparticles are comprised of a phase Co_2W_4C.

22. The hard metal according to one of the claims 12 to 21, characterized in that

the nanoparticles are comprised of one or several intermetallic phases of W and Co.

23. The hard metal according to one of the claims 1 to 22, characterized in that the WC grains are partially or entirely round.

24. The hard metal according to one of the claims 1 to 23, characterized in that the W concentration in the binder is in a range of 10 to 30 atomic %.

25. The hard metal according to one of the claims 1 to 24, characterized in that it contains 3 to 60 % by volume diamond grains with a coating of carbides, carbonitrides, and/or nitrides of Ti, Ta, Nb, W, Cr, Mo, V, Zr, Hf, and/or Si.

26. The hard metal according to one of the claims 1 to 25, characterized in that the binder contains fcc-Co and/or hcp-Co in the form of a solid solution of W and/or C in Co.

27. The hard metal according to claim 11 or 26, characterized in that the lattice constants of the solid solution is 1 % to 5 % greater than that of pure Co.

28. The hard metal according to one of the claims 1 to 27, characterized in that the binder contains up to 30 % by weight of Fe.

29. A tool for mechanically working, in particular, stone, concrete, and asphalt, comprising at least one cutting element, characterized in that the cutting element is comprised of a hard metal according to one of the claims 1 to 28.